

## **A new species of *Astyanax* (Characiformes, Characidae) from the upper río Bermejo basin, Salta, Argentina**

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**A new species of *Astyanax* (Characiformes, Characidae) from the upper río Bermejo basin, Salta, Argentina.** - *Astyanax latens* sp. n., from the Bermejo river basin, is described in this paper. *Astyanax latens* is diagnosed by a combination of characters: somewhat rhomboidal body; presence of 24-29 branched anal fin rays; 1-4 maxillary teeth; long pectoral fins (23.2-26.6 % of SL) always reaching one third of pelvic fin; long pelvic fins (17.6-22.0 % of SL) always surpassing anal fin origin; anal fin base long (32.3-36.7 % of SL); 26-27 gill rakers on first branchial arch; lateral band extremely narrow; one large vertically elongated humeral spot and a second one very faint; relatively shallow caudal peduncle (10.0-11.4 % SL); fifth tooth of inner premaxillary series very small and scarcely posterior to main series; origin of anal fin below dorsal fin.

**Key-words:** Characiformes - Characidae - *Astyanax* - new species - río Bermejo basin.

## **INTRODUCTION**

The genus *Astyanax* Baird & Girard, 1854 includes more than 100 nominal species (Garutti & Britski, 2000), distributed from Southern United States to the río Negro in Argentina (Almirón *et al.*, 1997). Since the original description of the genus, the most complete revision of *Astyanax* has been done by Eigenmann (1921, 1927) who diagnosed the genus with characters that are present in many Characiformes. Subsequently, many authors followed that classification (among others, Ringuet *et al.*, 1967; Géry, 1977; Bertaco & Malabarba, 2001). Traditionally, the genus is defined by the presence of two series of teeth in the premaxilla, the first series with several teeth, a second series with equal or graduated teeth, usually five in number, four in a few species; crowns of premaxillary and mandibular teeth usually ridged and denticulated; maxillary with few or none teeth; complete lateral line, gill rakers setiforms,

and absence of predorsal spine and scales on the caudal peduncle base. The combination of those characters still defines the species recognized within the genus which has never been considered in a phylogenetic revision.

About 20 species of the genus *Astyanax* were previously cited in Argentina. Some of those records need to be revised because they probably correspond to misidentifications due to external morphological similarities with species from other basins. A detailed revision of the species of the Río de la Plata basin is necessary, although, systematic papers concerning species of the genus *Astyanax* were published in the last recent years. Those papers reveal the presence of seven new species in the northeastern Argentina (Azpelicueta & García, 2000; Azpelicueta *et al.*, 2002a, 2002b; Almirón *et al.*, 2002; Casciotta *et al.*, 2003a, 2003b). Also, new collecting trips in the northwestern Argentina show the presence of new species, fact that allows us to describe *A. latens* sp. n. from the upper río Bermejo basin. The description of the new species is the objective of this paper, providing osteological information that may be useful in future phylogenetic studies.

## MATERIAL AND METHODS

Specimens were cleared and counterstained (C&S) following Taylor & Van Dyke (1985). Measurements are straight distances taken with calliper to nearest 0.01 mm. Standard length was measured from snout tip to hypural joint; head length includes opercular flap; length of caudal peduncle was the distance between last anal fin ray insertion and hypural joint. Counts of vertebrae include Weberian apparatus and the caudal complex centrum as one element.

Material is deposited in Asociación Ictiológica, La Plata (AI, asociacionictiologica@interlap.com.ar); Facultad de Ciencias Naturales y Museo, La Plata (MLP); Fundación Miguel Lillo, Tucumán (CI-FML); Museo Argentino de Ciencias naturales Bernardino Rivadavia, Buenos Aires (MACN); Museum d'histoire naturelle de Genève, Genève (MHNG); The Academy of Natural Sciences of Philadelphia, Philadelphia (ANSP).

COMPARATIVE MATERIAL (SL in mm). *Acrobrycon tarijae* Fowler, 1940: CI-FML 3270, 1 ex., 66.6 mm, Argentina, Salta, Orán, La Bambú, río Bermejo basin, río Blanco. *Astyanax abramis* (Jenyns, 1842): MLP 9427, 2 ex., 102.0-113.0 mm, Argentina, Misiones, río Paraná. *Astyanax cf. abramis*: CI-FML 3368, Argentina, Salta, Orán, La Bambú, río Bermejo basin, río Blanco. *Astyanax alleni* (Eigenmann & McAtee, 1907): MLP 6774, 5 ex., 50.0-64.2 mm, Argentina, Santa Fe, Laguna Setúbal. *Astyanax asuncionensis* Géry, 1972: MLP 8660, 5 ex., 43.6-61.4 mm, Argentina Santiago del Estero. Bañado de Añatuya. MLP 8844, 7 ex., 25.0-44.9 mm, Argentina, Formosa, río Bermejo basin, arroyo Mbiguá. *Astyanax eigenmanniorum* (Cope, 1894): ANSP 21627, paratypes, 2 ex., 42.5-49.4 mm, Brasil, Rio Grande do Sul. *Astyanax cf. eigenmanniorum*: CI-FML 3262, 23 ex., 29.4-50.7 mm, Argentina, Salta, La Bambú, río Bermejo basin, río Anta Muerta. *Astyanax cf. fasciatus*: MLP 7115, 1 ex., 47.8 mm, Argentina, Santa Fe, río Paraná basin, San José del Rincón, AI 111, 2 ex., 57.8-62.6 mm, Argentina, Buenos Aires, río de la Plata in Punta Lara. MLP 8647, 5 ex. 34.0-45.8 mm, Argentina, Santiago del Estero, río Salado. *Astyanax ita* Almirón *et al.*, 2002: MLP 9599, holotype, 64.0 mm, Argentina, Misiones, río Iguazú basin, arroyo Tateto. *Astyanax leonidas* Azpelicueta *et al.*, 2002: MLP 9580, holotype, 45.6 mm, Argentina, Misiones, río Paraná basin, headwaters of arroyo Urugua-I. *Astyanax lineatus* (Perugia, 1891): CI-FML 3272, 3 ex., 35.3-72.1 mm, Argentina, Salta, Orán, La Bambú, río Bermejo basin, río Blanco. *Astyanax ojiara* Azpelicueta & García: MLP 9470, holotype, 50.5 mm, Argentina, Misiones, arroyo Benítez. *Astyanax pynandi* Casciotta *et al.*, 2003a: MACN

8543, holotype, 52.0 mm, Argentina, Corrientes, Laguna Iberá. *Astyanax saguazu* Casciotta *et al.*, 2003b: MLP 9603, holotype, 63.0 mm, Argentina, Misiones, río Uruguay basin, arroyo Once Vueltas. *Astyanax troya* Azpelicueta *et al.*, 2002, MACN 8310, holotype, 73.8 mm, Argentina, Misiones, arroyo Cuñapirú Chico. *Bryconamericus iheringii* (Boulenger, 1887): MLP 9073, 110 ex. (5 measured), 39.9-44.3 mm, Argentina, Buenos Aires, Sierra de la Ventana. MLP 9103, 15 ex., 34.8-49.2 mm, Argentina, Buenos Aires, Berisso, Los Talas (Man-made ponds connected to Río de la Plata). *Bryconamericus thomasi* Fowler, 1940: CI-FML 1969, 94 ex. (5 measured, 2 males and 3 females), 40.3-55.4 mm, Argentina, Salta, río Piedras. *Moenkhausia intermedia* Eigenmann, 1908: CI-FML 3257, 60 ex. (5 measured), 20.1-31.5 mm, Argentina, Salta, Orán, La Bambú, río Bermejo basin, arroyo El Oculito. *Odontostilbe microcephala* Eigenmann, in Eigenmann & Ogle, 1907: CI-FML 3369, 2 ex., 48.2-51.6 mm, Argentina, Salta, La Bambú, río Bermejo basin, río Blanco. *Odontostilbe pequirá* (Steindachner, 1882): CI-FML 3451, 1 ex., 31.5 mm, Argentina, Salta, Rivadavia, río Bermejo basin, Pozo de los Yacarés. *Oligosarcus bolivianus* (Fowler, 1940): CI-FML 3277, 4 ex., 89.8-113.8 mm, Argentina, Salta, Orán, La Bambú, río Bermejo basin, río Blanco.

Cleared and stained material (Personal collection). *Astyanax abramis*: 2 ex., 74.5-92.0 mm, Argentina, Buenos Aires, río de la Plata in Punta Lara. *Astyanax asuncionensis*: 2 ex., 80.4-92.7 mm, Argentina, Misiones, río Uruguay in San Isidro. *Astyanax eigenmanniorum*: 1 ex., 45.0 mm, Brasil, Rio Grande do Sul, Viamão, açude Charolês; 2 ex., 17.7-33.0 mm, Argentina, Buenos Aires, desembocadura del río Colorado; 1 ex., 60.3 mm, Argentina, Buenos Aires, Río de la Plata. *Astyanax cf. fasciatus*: 2 ex., 91.0-106.5 mm, Argentina, Misiones, río Uruguay in San Isidro. *Astyanax latens* sp. n.: 2 ex., 40.6-44.0 mm, Argentina, Salta, Orán, La Bambú, río Bermejo basin, arroyo El Oculito. *Astyanax leonidas*: 6 ex., 33.0-45.6 mm, Argentina, Misiones, río Paraná basin, arroyo Urugua-í. *Astyanax ojiara*: 10 ex., 37.8-58.0 mm, Argentina, Misiones, arroyo Benítez. *Astyanax paris*: 3 ex., 66.2-68.5 mm, Argentina, Misiones, río Uruguay, arroyo Yabotí Guazú. *Astyanax saguazu*: 3 ex., 41.6-54.2 mm, Argentina, Misiones, río Uruguay basin, arroyo Once Vueltas. *Astyanax troya*: 2 ex., 76.0-81.5 mm, Argentina, Misiones, río Paraná, arroyo Cuñapirú Chico. *Astyanax* sp. A: 1 ex., 73.5 mm, Argentina, Misiones, arroyo Cuñapirú Chico.

## RESULTS

### *Astyanax latens* sp. n.

Figs 1-5, Table 1

*Holotype*. CI-FML 3400 male, 44.3 mm SL, Argentina, Salta, río Bermejo basin, arroyo El Oculito (64° 30' W - 23° 07' S), coll. M. Mirande & G. Aguilera, October 2001.

*Paratypes*. MHNG 2640.36, 5 ex., 44.0-52.0 mm SL, collected with the holotype. AI 110, 4 ex., 40.3-45.0 mm SL, Argentina, Salta, río Bermejo basin, arroyo El Oculito, coll. M. Mirande & G. Aguilera, February 2002. CI-FML 3401, 5 ex., 46.8-52.4 mm SL, Argentina, Salta, río Bermejo basin, arroyo El Oculito, coll. M. Mirande & G. Aguilera, November 2002, CI-FML 3402, 10 ex., 42.8-47.8 mm, Argentina, Salta, río Bermejo basin, arroyo El Oculito, coll. M. Mirande & G. Aguilera, February 2002. AI 112, 2 ex. C&S, 41.0-45.0 mm, Argentina, Salta, Orán, arroyo El Oculito, coll. M. Mirande & G. Aguilera, February 2002.

*Diagnosis*. *Astyanax latens* is distinguished from all other *Astyanax* species by the possession of somewhat rhomboidal body (body depth 34.9-39.1 % SL); 24-29 branched anal fin rays; 1-4 maxillary teeth; long pectoral fins (23.2-26.6 % of SL) always reaching one third of pelvic fin; long pelvic fins (17.6-22.0 % of SL) always surpassing anal fin origin; anal fin base long (32.3-36.7 % of SL); 26-27 gill rakers on first branchial arch; origin of anal fin placed below dorsal fin; fifth tooth of inner premaxillary series very small and scarcely posterior to main series; presence of one large vertically elongated humeral spot followed by a second one very faint; lateral band extremely narrow; 37-38 perforated scales in the lateral series, and relatively shallow caudal peduncle (10.0-11.4 % of SL).

*Description.* Morphometrics of holotype, 20 paratypes and 2 C&S specimens are presented in table 1. Body somewhat rhomboidal (Fig. 1), laterally compressed, with maximum body depth anterior to dorsal fin origin. Dorsal profile of body straight from snout to supraoccipital area, slightly concave above supraoccipital spine, convex from this point to dorsal fin origin; slanted ventrally from dorsal fin origin to caudal peduncle; gently concave along caudal peduncle to base of caudal fin rays. Ventral profile of body convex from tip of lower jaw to pelvic fin origin, somewhat straight between pelvic and anal fin origins, posterodorsally slanted from anal fin origin to caudal peduncle, and slightly convex along caudal peduncle. Ventral portion of body between bases of pectoral and pelvic fins transversally rounded; ventral portion of body between origins of pelvic and anal fins laterally compressed.

Dorsal fin origin usually nearer base of caudal fin rays than snout tip (see table 1). Pelvic fin origin situated markedly anterior to vertical through dorsal fin origin. Anal fin origin located on vertical through base of posteriormost dorsal fin rays. Tip of pectoral fin always reaching one third of pelvic fin or more; tip of pelvic fin always surpassing anal fin origin, in all specimens independently from size and sex.

Dorsal profile of head convex on snout and over eyes and slightly concave on supraoccipital area. Mouth terminal, placed at level of middle eye. Premaxilla bearing two series of teeth; ascending process with broad base and acute tip. Outer row with 3-5 (5 ex.= 3); (10 ex.= 4); (7 ex. including the holotype= 5) tricuspidate teeth, with circular base and distal tip slightly compressed; inner row with 5 teeth, anterior face of them slightly concave; symphyseal tooth slender, with 4 cusps; remaining teeth with five, four or three cusps; central cusp large and lateral ones small; fifth tooth much smaller than other teeth in series, usually tricuspidate, inserted posteriorly to fourth tooth (Fig. 2). Ascending maxillary process slender, straight; lateral process of maxilla long, laminar, and narrow, with 1-4 (1 ex.= 1); (16 ex.= 2); (4 ex. including holotype= 3); (1 ex.= 4) tricuspidate teeth (Fig. 3). Dentary with 11-13 teeth (2 ex.= 11); (1 ex.= 12); (1 ex.= 13); first three or four pentacuspidate and notably larger than remaining tricuspidate to conic teeth (Fig. 4). Posterior face of large dentary teeth convex near its base and slightly concave near distal tip. Dentary and premaxillary teeth of inner row bearing a central cusp large, slightly curved posteriorly and lateral ones small, placed oblique to main axis of central cusp.

Eye large, longer than snout, little more than two times in head; interorbital wide. Third infraorbital not contacting latero-sensory canal of preopercle either ventrally or posteriorly.

Dorsal fin with iii,8-9 rays (2 ex.= 8); (20 ex. including holotype= 9); distal margin of dorsal fin straight, with last unbranched and first branched dorsal fin rays longest. First unbranched dorsal fin ray mostly visible in cleared and stained specimens. Enlarged anal fin with iv-v. 24-29 rays (3 ex.= 24); (11 ex. including holotype= 25); (7 ex.= 26); (1 ex.= 29). Males with distal margin straight, and females with last unbranched and first five or six branched rays lengthened to form a small lobe. Males with hooks on last unbranched anal fin ray and posterior branch of first 8-16 branched anal fin rays; one pair of hooks per segment.

Caudal fin with principal rays i,17,i; ventral caudal lobe longer than upper one. Pectoral fin with i,12-14 rays (3 ex.= 12); (13 ex.= 13); (6 ex. including holotype= 14),

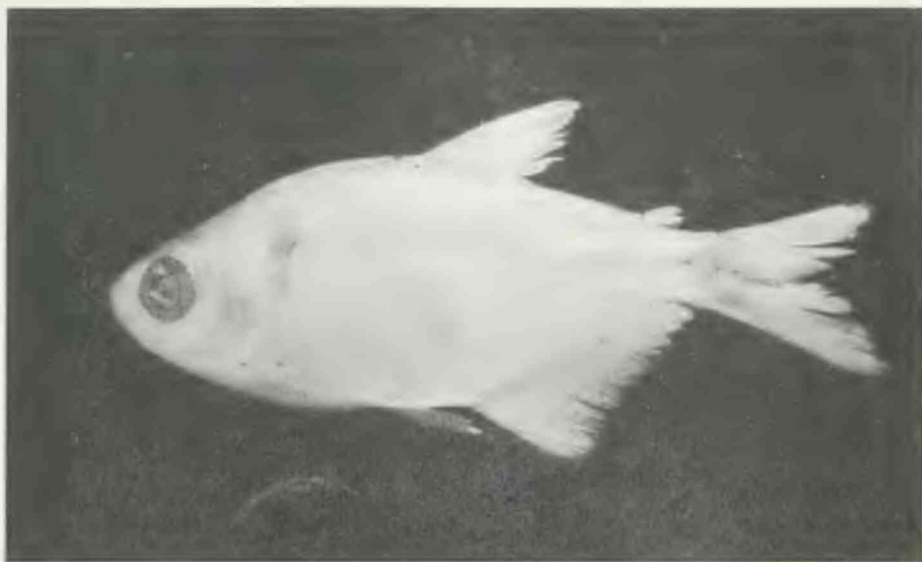


FIG. 1

*Astyanax latens* sp. n., holotype, CI-FML. 3400, male, 44.3 mm SL, Argentina, province of Salta, Orán, río Bermejo basin, arroyo El Oculito.

one non-type specimen with 11; distal margin straight. Pelvic fin with i,7 rays (one specimen with i,6); pelvic fin distal margin slightly rounded. Males bearing hooks in all branched pelvic fin rays, usually on posterior branch; sometimes, more than one pair of hooks per segment.

Scales cycloid. Lateral series with 37-38 (8 ex.= 37); (14 ex. including holotype= 38; one non-type specimen with 39) perforated scales. Scales between dorsal fin origin and lateral line 7; scales between lateral line and pelvic fin origin 6-7. Scales around caudal peduncle 14-15. Scales between tip of supraoccipital spine and base of dorsal fin 12-13, usually forming a regular row. One row of scales situated along anal fin base, covering base of all unbranched and first twelve to fifteen branched anal fin rays. Few scales on caudal fin base.

Colour in life: Body uniformly silvery, dark on dorsal part of flanks. Lateral band inapparent. First humeral spot vertically elongated, narrow, and second one faint. Caudal spot visible, occupying complete depth of caudal peduncle. Anal and caudal fins orange, becoming redish in specimens recently collected.

Colour in alcohol preserved specimens: Body uniformly yellowish. First black humeral spot vertically elongated, very narrow; second one faint although always marked. Chromatophores scattered over body, especially concentrated on dorsal portion of flanks, forming a reticulate pattern. In lower half of flanks, chromatophores following myosepta; also, chromatophores forming lines perpendicular to anal fin base. Lateral band very narrow, formed by small superficial chromatophores and deep chromatophores placed as small V, with vertex directed anteriorly. Caudal spot well developed, black, triangular or irregular in shape, extending on middle caudal fin rays.

TABLE 1. *Astyanax latens* sp. n. Morphometrics of holotype and 20 paratypes. Minimum, maximum, and mean  $\pm$  standard deviation in brackets. SL is measured in mm. SOC= supra-occipital

	holotype 44.3	females (n=10) 42.3 – 52.5	males (n=11) 43.6 – 52.0
<b>SL</b>			
<b>% of standard length</b>			
Predorsal distance	53.8	51.9 – 55.6 (54.4 $\pm$ 1.1)	51.7 – 55.3 (53.7 $\pm$ 1.0)
Preventral distance	42.8	44.3 – 46.3 (45.5 $\pm$ 0.8)	42.6 – 45.8 (46.0 $\pm$ 1.2)
Preanal distance	59.1	59.9 – 63.3 (61.5 $\pm$ 1.2)	57.6 – 61.0 (59.5 $\pm$ 1.2)
Body depth	38.5	36.1 – 39.1 (37.3 $\pm$ 0.9)	34.9 – 38.8 (37.5 $\pm$ 1.2)
Anal-fin base	35.7	32.3 – 36.6 (33.5 $\pm$ 1.3)	33.6 – 36.7 (34.8 $\pm$ 0.9)
Pectoral-fin length	25.9	23.8 – 26.6 (25.0 $\pm$ 0.8)	23.2 – 25.9 (24.9 $\pm$ 0.8)
Pelvic-fin length	20.3	17.6 – 20.4 (19.4 $\pm$ 0.8)	17.6 – 22.0 (20.0 $\pm$ 1.2)
Distance between pectoral and pelvic fin origins	18.5	18.6 – 21.8 (20.1 $\pm$ 1.0)	18.2 – 19.9 (19.0 $\pm$ 0.5)
Distance between pelvic and anal fin origins	17.3	16.6 – 20.0 (18.4 $\pm$ 0.9)	15.6 – 18.7 (17.2 $\pm$ 1.0)
Head length	27.2	25.8 – 28.5 (26.9 $\pm$ 0.7)	25.8 – 28.1 (27.1 $\pm$ 0.6)
Prepectoral distance	26.6	25.8 – 27.8 (27.0 $\pm$ 0.6)	24.7 – 28.3 (26.9 $\pm$ 1.1)
Postdorsal distance	38.3	36.4 – 40.6 (38.3 $\pm$ 1.3)	35.5 – 40.5 (38.3 $\pm$ 1.5)
Snout tip-SOC posterior tip	28.6	26.3 – 28.0 (27.2 $\pm$ 0.5)	26.2 – 28.9 (27.7 $\pm$ 0.9)
Caudal peduncle depth	11.1	10.0 – 11.4 (10.6 $\pm$ 0.5)	10.2 – 11.3 (10.8 $\pm$ 0.3)
Caudal peduncle length	11.6	10.7 – 12.9 (11.5 $\pm$ 0.8)	10.7 – 13.2 (11.9 $\pm$ 0.8)
<b>% of head length</b>			
Peduncle length	42.6	38.3 – 49.0 (43.0 $\pm$ 4.0)	38.9 – 51.2 (43.9 $\pm$ 4.0)
Peduncle depth	40.6	38.0 – 41.8 (39.4 $\pm$ 1.3)	38.8 – 41.3 (39.9 $\pm$ 0.9)
Snout length	26.4	22.4 – 25.0 (23.6 $\pm$ 0.8)	22.4 – 26.4 (23.9 $\pm$ 1.0)
Eye diameter	40.3	38.4 – 42.1 (40.1 $\pm$ 1.3)	35.9 – 41.2 (38.8 $\pm$ 1.4)
Interorbital width	29.7	27.5 – 30.5 (29.2 $\pm$ 0.9)	27.8 – 32.2 (29.3 $\pm$ 1.1)
Maxillary length	34.9	31.6 – 36.6 (34.0 $\pm$ 1.5)	30.0 – 35.2 (33.8 $\pm$ 1.4)
Premaxillary+maxillary length	41.8	37.4 – 40.8 (39.5 $\pm$ 1.1)	36.7 – 41.8 (39.5 $\pm$ 1.6)

Dorsal fin with scattered small chromatophores along fin rays. Adipose fin with few chromatophores on its base. Black chromatophores scattered on caudal and anal fins, especially on membranes and along ray margins. Pectoral and pelvic fins with few chromatophores along ray margins. Dorsum of head dark; chromatophores concentrated on premaxilla, many of them on maxilla and upper portion of dentary. A line of black chromatophores around eye.

*Osteological characters.* In 6 cleared and stained specimens: first branchial arch bearing 26-27 gill rakers placed as follow: 9-10 on epibranchial, 1 on cartilage, 14 on ceratobranchial, and 2 on hypobranchial.

Caudal fin with 8-9 dorsal and 7-8 ventral procurent rays. Thirty five to 37 vertebrae (percaudal vertebrae 15-16, caudal vertebrae 20-22). Ten or eleven dorsal fin pterygiophores between neural spines of vertebrae 10-11 and 18-19; 27-28 anal fin pterygiophores between hemal spines of vertebrae 17 and 28-29. First anal fin pterygiophore bearing 4 unbranched anal fin rays. Five or six supraneurals; 10-11 pairs of ribs.



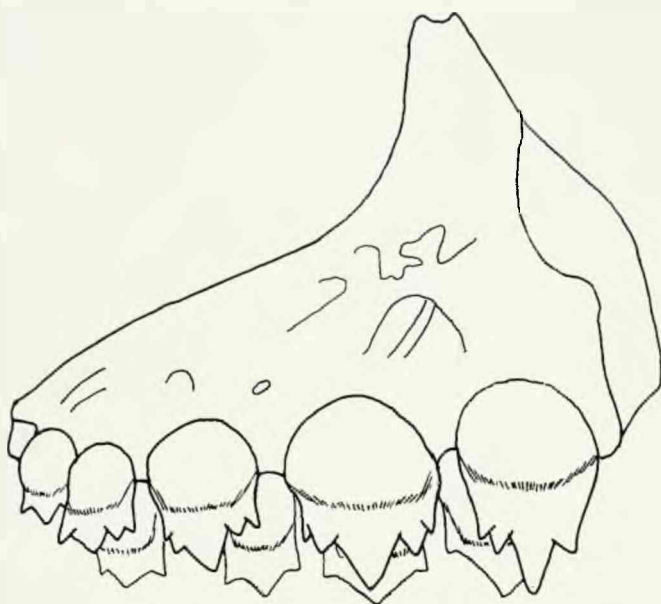


FIG. 2

*Astyanax latens* sp. n., 44.0 mm SL, premaxilla in left internal view. Scale bar = 1 mm.

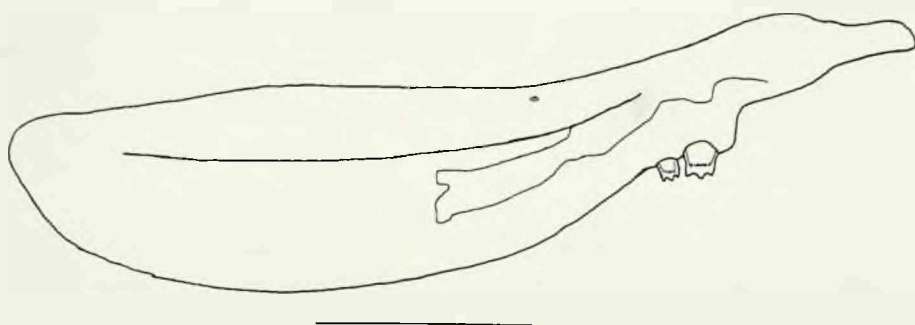


FIG. 3

*Astyanax latens* sp. n., 44.0 mm SL, maxilla in left internal view. Scale bar = 1 mm.

Upper edge of dentary almost parallel to lower mandibular margin; dentary foramen placed anteriorly and scarcely above level of Meckel cartilage. Cusps of premaxillary teeth placed forming an almost straight line in ventral view.

Ventral surface of mesethmoid with lateral and medial processes for vomer articulation forming an obtuse angle. Rhinosphenoides well ossified occasionally.

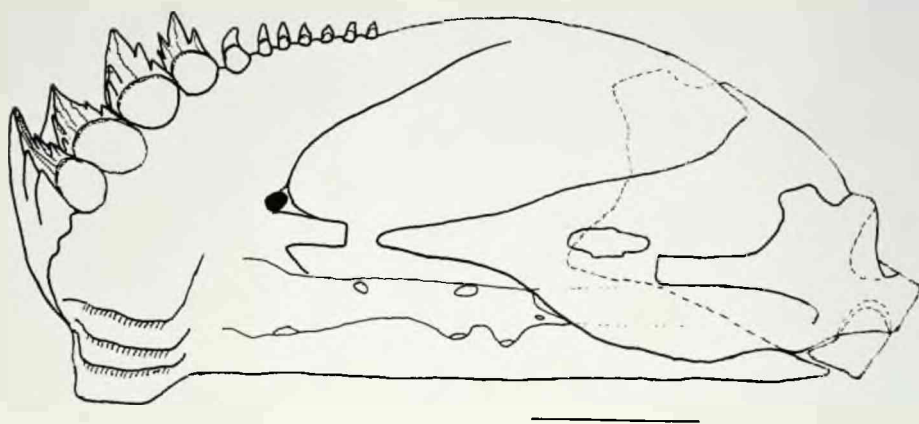


FIG. 4

*Astyanax latens* sp. n., 44.0 mm SL, lower jaw in medial view. Scale bar = 1 mm.

**Etymology.** The specific epithet *latens* is a Latin word that means hidden; the spanish name of the type locality also means hidden.

**Distribution.** *Astyanax latens* is known from arroyo El Oculito and the rivers Anta Muerta and Blanco, which flow into upper río Bermejo (Fig. 5). The type locality of *A. latens*, arroyo El Oculito, is a small stream of springs, with clear and slow water, muddy bottom and pools more than 1 m deep. The temperature and the caudal of the water are constant along the year, contrasting with those of streams and rivers of the area under marked seasonality. The place where *A. latens* was found is usually covered by shadow of the circumambient vegetation; many specimens were collected all around the year. A lower number of specimens of *A. latens* was occasionally found in the río Anta Muerta, a tributary on río Blanco in which other specimens were collected also.

## DISCUSSION

*Astyanax latens* sp. n. is differentiated from the species of the genus living in southern South America by the presence of 28-34 and fin rays in combination with other characters. *Astyanax pelegri* (41-45), *A. erythropterus* (45), *A. correntinus* (45), and *A. allen* (39-41) have higher number of anal fin rays. Low number of anal fin rays is present in *A. brachypterygium* (16-20), *A. cremnobates* (18-22), *A. gymnogenys* (21-22), *A. scabripinnis paranae* (17-23), *A. ita* (23-28), *A. eigenmanniorum* (22-26), *A. ojiara* (24-28), *A. troya* (22-26), *A. leonidas* (20-25), *A. pynandi* (21-26), and *A. paris* (24-27). The number of maxillary teeth of *A. latens* (1-4) is shared with *A. paris*.

The pigmentation pattern of *A. lineatus* (with several bands along the flanks), *A. laticeps* (with horizontally oval humeral spot), and *A. marionae* (without caudal spot) distinguishes them from *A. latens* wich only has a very narrow lateral band, humeral spot vertically elongated, and triangular caudal spot.



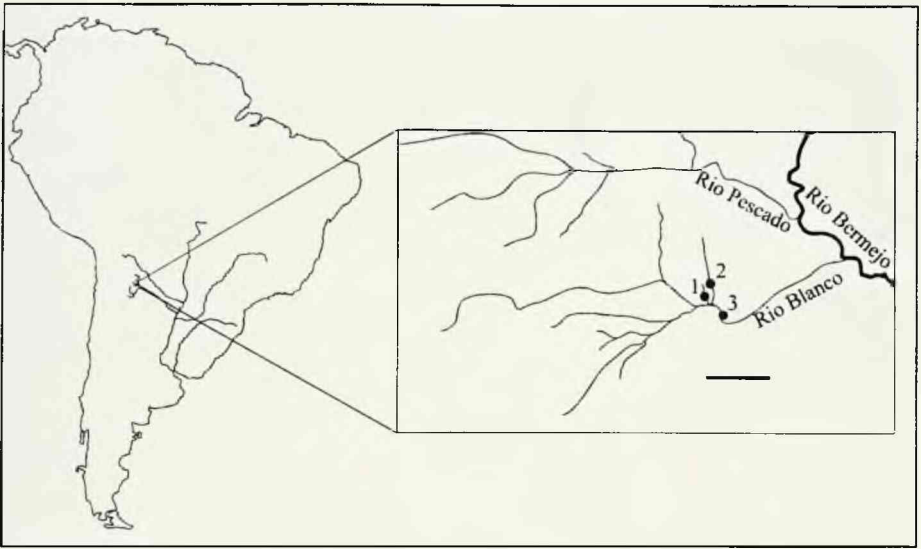


FIG. 5

Geographic distribution of *Astyanax latens* sp. n. in Argentina, Salta, río Bermejo basin. 1, arroyo El Oculito (type locality); 2, río Anta Muerta; 3, río Blanco. Scale bar = 10 km.

*Astyanax asuncionensis* (30-32) and *A. abramis* (30-34) have similar number of anal fin rays, but they also bear a horizontally elongated humeral spot, and 0-1 maxillary tooth. A similar number of anal fin rays than that of *A. latens* is present in *A. cf. fasciatus* (24-31). However, *A. cf. fasciatus* has a wide lateral band, only one maxillary tooth (vs. 1-4), shorter pectoral fins never reaching pelvic fin origin (vs. pectoral fin tip always surpassing pelvic fin origin), and distal tips of premaxillary teeth placed forming an arch of 180°, with concavity directed anteriorly (vs. premaxillary teeth cusps placed forming a line or scarcely curved). Also, *A. latens* is a smaller species, it occasionally reaches more than 55 mm SL.

*Astyanax saguazu* shares the number of anal fin rays, the number of scales in the lateral series, and the disposition of the teeth cusps with *A. latens*. Nonetheless, *A. saguazu* has a notable lateral band and 19-23 gill rakers on first branchial arch whereas *A. latens* has very narrow lateral band and 26-27 gill rakers on the same arch. Also, *A. saguazu* has a larger eye (41.1-45.5 % vs. 38.4-42.1 % HL), and a shorter predorsal distance (46.3-52.9 % vs. 51.7-55.6 % SL), pectoral (21.6-24.7 % vs. 23.2-26.6 % SL) and pelvic (16.5-18.8 % vs. 17.6-22.0 % SL) fin lengths, and anal fin base (29.5-33.8 % vs. 32.3-36.7 % SL).

#### OSTEOLOGICAL CONSIDERATIONS

Few osteological characters of species included in the genus *Astyanax* are known; most of them concern teeth and jaws. With no doubt, a revision of the genus is needed and, as the diagnostic characters of the genus could be plesiomorphic characters, a phylogenetic study will be welcomed.

In comparison, the teeth of different species of *Astyanax* bear several characters that could help to differentiate them. *Astyanax latens* shares with *A. saguazu* and *Astyanax* sp. A, a maximum of five cusps in the teeth, while most species of *Astyanax* examined have the larger teeth with seven cusps or more (e.g., *A. cf. fasciatus*, *A. eigenmanniorum*, *A. troya*, *A. ojiara*, *A. asuncionensis*, *A. ita*). Also, the base of the inner premaxillary teeth is broader than the distal portion in *A. latens*, *A. saguazu*, and *Astyanax* sp. A. whereas some species have premaxillary teeth with broad distal portions (e.g., *A. troya*, *A. ojiara*, *A. pynandi*, *A. giton*, *A. hastatus* following Melo, 2001).

Most of the *Astyanax* species examined have cusps of the inner premaxillary teeth forming an arch of 180° in ventral view, and leaving an anterior concavity (among others, *A. lineatus*, *A. asuncionensis*, *A. abramis*, *A. eigenmanniorum*, *A. troya*, *A. ojiara*, *A. leonidas*, *A. cf. fasciatus*, *A. allenii*). *Astyanax latens*, *A. saguazu*, and *Astyanax* sp. A have premaxillary cusps arranged in a straight line.

The crest for insertion of the *adductor operculi*, in the internal surface of opercle, is very small in *A. latens* whereas the crest is longer, occupying more than half of the distance between anterior and posterior opercular margins in other species such as *A. ojiara*, *A. ita*, *A. paris*, *A. lineatus*, or *A. asuncionensis*.

*Astyanax latens* shares some characters with species of different genera. For example, the ventral mesethmoides processes for articulation of the vomer are usually T-shaped as in *Brycon* (Weitzman, 1964), *Oligosarcus* (per. obs.), and other species of the genus *Astyanax* (e.g., *A. abramis*, *A. asuncionensis*, *A. lineatus*, pers. obs.); in contrast, the ventrolateral and ventromedial processes of mesethmoides form a slight angle (almost Y-shaped) in *A. latens*, *Moenkhausia intermedia*, and *Acrobrycon tarifae*. This angle was observed to be more pronounced in *Bryconamericus iheringii*, *B. thomasi* and *Odontostilbe pequirá*.

The posteroventral process of pterotic is present in *Brycon* (Weitzman, 1964; per. obs.), *A. abramis*, and *A. asuncionensis*, whereas it is absent in *A. latens*, most species of *Astyanax*, *Moenkhausia intermedia*, *Acrobrycon tarifae*, *Bryconamericus thomasi*, and *Odontostilbe pequirá*.

All these observations show that detailed revisions of the genus *Astyanax* and other genera of tetragonopterine characiforms of the family Characidae, probably closely related as *Hyphessobrycon*, *Moenkhausia*, or *Hemigrammus*, are necessary to establish polarity of characters and the intrageneric relationships among them.

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